not cause them to change. Hence the effect of FAS 106 on output prices is confined to the regulated sector, and we estimate its effect on the rate of growth of GNP-PI to be less than 0.12 percent per year.

II. BACKGROUND

In December 1990, the FASB issued a formal statement, "Statement of Financial Accounting Standards No. 106" (FAS 106), acknowledging that the provision of other post-employment benefits (OPEBs) is a form of deferred compensation and that accounting for OPEBs should be changed from a cash to an accrual basis. Cash accounting, which recognizes OPEB costs only when they are paid to retirees, understates current costs and overstates future costs of employing any individual worker. If the prices of a regulated firm are set to recover book costs, cash accounting for OPEBs can lead to an intertemporal subsidy in which current ratepayers pay less than the true cost of service and future ratepayers pay more.

Implementation of accrual accounting for OPEBs in 1993 means that going forward, the OPEB liability will be recognized on the books of the company when the liability is incurred (i.e., while the employee is working and qualifying for the benefit) rather than when the liability is actually paid (after the employee retires and receives medical, dental, or life insurance benefits covered by the plan).[2] This liability will have several components. First, companies must account for the actuarial present value

[2]In addition, FAS 106 requires that the unrecognized accumulated liability to active and retired workers for OPEBs be recognized either in 1993 or amortized over an acceptable time period.

of future OPEBs that are associated with employees hired prior to 1993. For many companies, this liability is a large fraction of their net worth; thus FAS 106 permits companies to amortize this liability over a period not to exceed 20 years. Second, companies must recognize the expected present value of OPEBs to which active employees become entitled in a given year. Annual interest on the entire OPEB obligation is an additional expense to be recognized under accrual accounting for OPEBs. Finally, accrued costs are reduced by the actual return on qualified plan assets.

This change in accounting costs for OPEBs raises the following regulatory question: With the adoption of FAS 106 by the FCC, what is the appropriate regulatory treatment under the price cap plan of the change to accrual accounting for OPEBs?

III. THE THEORETICAL BASIS FOR EXOGENOUS COST TREATMENT

In this section, we show how a Z-adjustment should be calculated in the price cap formula given that the firm has experienced an exogenous change in costs for which Z treatment is appropriate. To understand how Z should be measured, we must understand where the annual price cap adjustment formula comes from and what it is supposed to accomplish.

The purpose of the annual price cap adjustment is to insure that if the regulated firm meets its productivity growth objective, its adjusted revenues will just track its costs every year, whatever the level of inflation happens to be. In the FCC

price cap plan for Tier 1 LECs, we fix a productivity target X, annually observe inflation measured by GNP-PI, and calculate Z-adjustments whenever appropriate so that if the productivity objective is met, the allowed change in the regulated firm's price will be close to its change in costs. Thus, our explanation begins with the total factor productivity (TFP) growth objective for the regulated firm, *dTFP*, which represents the annual year-over-year percentage growth in the regulated firm's TFP. From the productivity growth target and the objective of having revenues track costs, we derive below the annual price cap adjustment formula used in the FCC price cap plan. Once we know how the variables GNP-PI, X, and Z in the plan are derived and what they are supposed to measure, we can interpret them in the context of FAS 106 accounting changes.

A. Price Cap Theory[3]

A basic identity in economic theory states that the rate of growth of TFP is equal to the difference between the rates of growth of the firm's input prices and output prices.[4] Applying this rule to the regulated telecommunications firm, we write

$$dp^* = dw - dTFP$$

where dp^* represents the annual percentage change in the telecommunications firm's output prices, and dw represents the annual percentage change in its input prices. To

[3]The price cap plan for Tier 1 LECs includes a factor that accounts for non-traffic sensitive costs. We ignore this term in our discussion, since it is not part of the theoretical basis for price caps.

[4]We show this formally in the Appendix.

raise or lower the firm's output price in order to track exogenous changes in cost, we write

(1) $$dp = dw - dTFP + Z^*$$

where dp represents the annual percentage change in the telecommunications firm's output prices adjusted for exogenous cost changes, and Z^* represents the unit change in costs due to external circumstances.[5] Thus, to keep the revenues of a price cap regulated firm equal to its costs despite inflation, the price cap formula should (i) increase the firm's output prices at the same rate as its input prices less the target change in productivity growth, and (ii) directly pass through exogenous cost changes.

Equation (1) looks a great deal like the annual adjustment equation in the FCC price cap plan: the allowed price change for the firm is set at a measure of its input price change less its TFP growth adjusted for exogenous cost pass-throughs. If GNP-PI were taken as a measure of the firm's input price growth and X were the firm's TFP growth target, equation (1) would indeed be the same as the price adjustment formula (apart for the adjustment for nontraffic sensitive costs). However, there are two errors in this interpretation:

1. The GNP-PI is a measure of national output price growth, not input price growth. So even if the regulated firm is a microcosm of U.S. industry, GNP-PI is not an appropriate measure of its input price growth.[6]

2. X in the price cap plan is a target TFP growth rate for the regulated firm relative to U.S. industry as a whole (or

[5]Note that Z^* can be positive or negative.

[6]Recall that input price growth differs from output price growth by the growth in TFP. Only if $DTFP^N$ were 0 could GNP-PI be a good measure of national input price growth.

relative to the TFP growth already embodied in the GNP-PI). The change in TFP in equation (1) is the absolute TFP growth for the regulated firm. Again, unless U.S. TFP growth is 0, X is not equal to *dTFP*.

To get from equation (1) to the price adjustment formula, we must compare the productivity growth of the regulated firm with the productivity growth of the U.S. economy. The reason for this comparison is that it is difficult to measure input price growth objectively. In particular, no competent party outside of the industry, such as the Bureau of Labor Statistics or the American Productivity Center, maintains an index of telecommunications input prices. However, by comparing productivity growth of the firm with that of the U.S. economy, the difficult measurement of input price growth can be avoided.

For the U.S. economy as a whole, the existence of effective competition implies that there are no long run excess profits, so the relationship among input prices, output prices, productivity, and exogenous cost changes can be derived for the nation as a whole in the same manner as it was derived in equation (1) above:

$$(2) \qquad dp^N = dw^N - dTFP^N + Z^{*N}$$

where dp^N is the annual percentage change in a national index of output prices; dw^N is the annual percentage change in a national index of input prices; $dTFP^N$ is the annual change in the economy-wide total factor productivity, and Z^{*N} represents the change in national output prices caused by the exogenous factors included in equation (1). If we subtract equation (2) from equation (1), we see that

$$dp - dp^N = [dw - dw^N] - [dTFP - dTFP^N] + [Z^* - Z^{*N}],$$

or

$$(3) \qquad dp = dp^N - [\, dTFP - dTFP^N + dw^N - dw \,] + [\, Z^* - Z^{*N} \,].$$

Equation (3) is the theoretical equivalent of the price adjustment formula. The allowed price change for the regulated firm for a particular year is given by:

1. the rate of inflation of national output prices dp^N, (GNP-PI),
2. less a fixed productivity offset, X, which represents a target productivity growth differential between the regulated firm and the U.S. economy,[7]
3. plus unit exogenous cost changes, written as the difference in the unit costs of the exogenous change between the regulated firm and the U.S. economy.

Simple algebra translates equation (3) into the formula that appears in the price cap plan (again, apart for the adjustment for non-traffic sensitive costs):[8]

$$(4) \qquad R_t = R_{t-1} \times [\, 1 + GNP\text{-}PI - X \,] + Z$$

where R_t represents the regulated firm's revenue in year t using base period quantities.

In words, the change in the regulated firm's output price that will just track the change in its costs, whatever the level of inflation, is equal to (i) the change in a national index of output prices, less (ii) the difference between the change in total factor productivity for the telecommunications firm and for the nation as a whole,[9]

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[7]This differential is equal to the difference between the firm and U.S. TFP growth rates only if the rates of input price growth are the same for the firm and the nation: i.e., if $dw = dw^N$. Evidence supporting this assumption was presented by Dr. Laurits Christensen in Appendix F of AT&T's Comments in response to the FCC's Notice of Proposed Rulemaking in CC Docket 87-313, filed October 19, 1987. According to Dr. Christensen's calculations, input cost inflation for the Bell System and for the total U.S. private domestic economy averaged 4.5% and 4.6% respectively for the years 1948 through 1979.

[8]The equivalence of equations (3) and (4) are shown in the Appendix to this paper.

[9]Adjusted for possible differences between input price growth rates for the firm and the nation.

plus (iii) the difference between the effect of exogenous changes on the costs of the telephone firm and on the costs of the nation as a whole. This equation is the foundation of the price adjustment formula in the FCC price cap plan. In this plan, GNP-PI and Z are measured annually, but X is fixed as the target amount by which the firm's TFP growth should exceed U.S. TFP growth. If the firm exceeds its productivity target, revenue growth will exceed cost growth and the firm will make higher profits. If the firm falls short of its productivity target, revenue growth will fall short of cost growth and profits will fall.

B. Accounting Cost Changes in the Price Cap Formula

Changes in the method of accounting for OPEBs will result in large changes in accounting costs. However, accounting costs are different in principle from economic costs. In this section, we examine the effects of a change in accounting costs (such as the adoption of accrual accounting) on firms in competitive markets and on regulated firms.

The single most critical economic fact in this case is that costs recognized under FAS 106 accrual accounting for OPEBs reflect economic costs. Costs recognized under cash accounting for OPEBs do not.[10] Two important consequences follow from this fact. First, in unregulated markets, prices already reflect the economic costs of

[10]Accrual accounting for OPEBs estimates the present value of the liability for current services rendered by an employee in a given year. To measure the labor component of incremental cost (for a service), one would calculate the increase in person-hours (for different types of labor) caused by a hypothetical increase in demand. Each additional person-hour would add, to the total cost of the firm, an amount equal to the sum of wages and benefits. The cost of additional benefits to the firm caused by the additional person-hour is the present value of the liability that the firm expects to pay at some later date. That present value is the cost estimated by accrual accounting methods.

OPEBs, and the change from cash to accrual accounting will have no effect on prices in those markets. Second, in regulated markets where prices are based on accounting costs, prices do not reflect accrual accounting for OPEBs, and thus do not reflect economic costs for services. When adopted for ratemaking purposes, the change from cash to accrual accounting in regulated markets would move prices towards economic costs and would remove the intergenerational inequities embodied in the current price structure.

1. Utility Prices Should Reflect Economic Costs

There is general agreement among economists and regulators that public utility prices should be based, to the extent possible, on economic costs. To an economist, such prices are desirable because they promote economic efficiency. To a regulator, cost-based prices tend to be just and reasonable because they insure that customers pay their own way, in the sense of paying at least as much for the additional service they demand as it costs to produce that additional service. Previous FCC actions (e.g., the transition towards flat-rate recovery of interstate non-traffic sensitive costs) are consistent with this pricing objective.

Moving current prices towards current costs increases efficiency and reduces an intergenerational inequity. This inequity stems from regulatory practices that inappropriately defer cost recovery into the future, reducing current prices below current economic costs while raising future prices above future economic costs. Such practices include cash accounting for pensions or OPEBs, and the use of overly long depreciation lives instead of economic depreciation lives for capital recovery. The

resulting prices are inequitable because future ratepayers are burdened with the cost of services consumed by current ratepayers. They are also inefficient because (i) ratepayers never face proper incentives for choosing among services, and (ii) utilities never face the same costs of providing OPEBs as unregulated firms.

Under the FCC price cap plan, the initial rates are taken to be just and reasonable. The FCC observed in its Second Report and Order, CC Docket 87-313, (October 4, 1990):

> "...LEC interstate access rates, as they existed on July 1, 1990 and were adjusted by an Erratum, [footnote deleted] are the most reasonable basis from which to launch a system of price cap regulation," p. 97.

These initial rates reflect cash accounting for OPEBs. Thus, the price cap index must be adjusted to align prices under price caps with economic costs.

2. Accrual Accounting Costs for OPEBs Are Economic Costs

The economic costs of hiring an additional worker are given by the sum of wages paid and the present value of expected pension and OPEB expenses for that worker. OPEB expenses measured under cash accounting are of no use to a manager trying to decide how many workers to hire or what mixture of salary and benefits to offer. They are irrelevant because expenses for OPEBs under cash accounting are determined by the medical experiences of people who are not currently working. In unregulated markets, managers hire workers until the value of the additional output of the last worker just equals the additional cost of hiring that worker. The cost of hiring a worker is the sum of the costs of wages, pensions, and OPEBs. Competitive

pressures prevent managers from treating the costs of pensions and OPEBs as anything other than the present value of the expected cost of that benefit.

3. Prices in Unregulated Markets Reflect Accrual Accounting for OPEBs

In economic theory, a firm that used cash accounting for OPEBs in making decisions could not survive in competitive markets. Today--when cash accounting costs for OPEB are low--the firm would hire too much labor, include too large a component of OPEBs in its compensation offers to prospective employees, and price its products below their profit-maximizing levels. In the future--when cash accounting costs for OPEBs are high--the firm would hire too little labor, include too small an OPEB component in its compensation mix, and price its product above the true profit-maximizing level. As competitive forces move prices towards incremental cost, prices could no longer reflect cash accounting for OPEBs.

Even in unregulated but non-competitive markets, output prices would still reflect accrual accounting for OPEBs rather than cash accounting. An unregulated monopolist that used cash accounting for OPEBs in making decisions would also hire the wrong amount of labor, offer an inefficient mix of wages and benefits, and price its product incorrectly. If unregulated monopolists manage their affairs so as to maximize economic profits, their input decisions and output prices will reflect accrual accounting for OPEBs. Thus a change in accounting standards from cash accounting to accrual accounting for OPEBs should not change prices in unregulated markets, irrespective of the degree of competition in those markets.

Empirically, there is abundant evidence showing that shifts in accounting standards have negligible effects on firms in unregulated markets. A search of the empirical literature (see Section IV) examining the effects of the 1987 FASB change in the method of accrual accounting for pension benefits revealed no evidence linking stock prices and pension accounting changes. Thus in unregulated markets, additional OPEB accounting costs have been recognized by the corporations in prices and by financial analysts as a liability of the firm. The accounting recognition of these costs, therefore, has no impact on the financial situation of the firms. Accounting costs, however, have determined prices for regulated firms, from which we conclude that OPEB expenses are currently (before adoption of FAS 106) treated differently for pricing decisions by managers of regulated and unregulated firms.

4. Cash Accounting for OPEBs Distorts Competition in Labor and Telecommunications Service Markets

Regulated and unregulated firms compete for workers in the labor market, and with prices set by cash accounting for OPEBs, regulated firms face different incentives to offer wages, pensions, and OPEBs to workers than those of unregulated firms. With competition for telecommunications services, the consequences of this distortion are even greater. Price limits for regulated firms in competitive markets today are set through a price cap formula whose starting point was based on cash accounting costs for OPEBs. Competitors' prices are determined by their economic

costs which include OPEB costs as measured by accrual accounting.[11] As interstate access services become more competitive, it is essential that regulatory distortions in pricing be removed.

While any departure from economic costs sends the wrong signals to ratepayers, the adverse consequences are much greater when a utility faces growing competition. In the case of a monopoly utility, the inappropriate deferral of cost recovery produces prices that are too low early on, but too high later. These price signals will cause too much service to be consumed in the earlier period and too little later on. However, for the amount of service provided in each period, there is no reason to believe that the utility's incentives to produce efficiently are distorted.

When regulated markets are opened to competitive entry, the inefficiencies from inappropriate timing of cost recovery become more important. There are two reasons for this observation. First, since true economic costs play a crucial role in the terms and conditions for competition, any deviation from true economic cost in the measurement of the incumbent utility's cost can distort the competitive process. For example, if the price floors for competitive services are based upon inappropriate cost recovery assumptions, they could be too low in an early period and too high later on. Such an outcome could frustrate the objective of the most efficient firm being able to provide competitive services.[12]

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[11]This phrase should not be taken to imply that Pacific Bell's competitors will quickly move to fund OPEBs or to change their prices when they change their accounting. In unregulated markets, prices are set by the market and by the level of economic costs. Irrespective of accounting conventions, economic forces will drive the firm's prices towards a level consistent with accrual accounting for OPEBs.

[12]The incremental cost for a given service includes as a labor component, the accrued OPEB expenses associated with the labor needed to provide that service, but it does not include any of the historical costs that arose from deferring recovery of costs associated with previously provided services.

Second, with competition and incentive regulation, the FCC can no longer guarantee recovery of deferred costs. In particular, the utility is at risk for the recovery of the historical liability under incentive regulation. Failure to adjust price ceilings to offer the utility the opportunity (1) to cover these historical costs and (2) to recover the economic costs of ongoing operations under competition raises the real possibility that the utility will never fully recover legitimately incurred costs of service.

5. Conclusion

To have a perceptible economic effect, an accounting change must cause a change in some prices in the economy. In competitive markets, prices are determined by the interaction of customer wants (demand) and costs of production (supply). A change in accounting convention clearly has no effect on customer demands. If accounting changes are to affect prices at all, they must affect the economic cost of producing goods and services and thus the amount that firms are willing to supply at a given price. Economic theory teaches that firms make supply decisions on the basis of economic costs, not accounting costs. When a profit-maximizing firm decides whether or not to hire an additional worker, it weighs the value of the additional output the worker produces against the additional cost that hiring the worker entails. If the compensation package for a worker includes OPEBs, a profit-maximizing firm would include the expected present value of OPEB costs as a cost in its hiring decision. A firm which ignored OPEB costs would hire too many workers and would experience higher than minimum costs in the long run. A competitive firm that made hiring decisions based on cash accounting figures for OPEBs would hire too many workers today (when its pool of accumulated retirees with OPEBs is small) and too

few workers later (when its annual cash OPEB obligation is large). Competition in the market--particularly entry from profit-seeking firms--drives prices towards economic costs which in turn forces high cost firms to leave the market. Thus, in competitive markets, the firm's supply curve--the amount of goods and services it is willing to produce for a given price--must reflect the economic cost of OPEBs regardless of their accounting treatment. A change to accrual accounting for OPEBs would have no effect on output prices in competitive markets: effectively, the accrual has already been recognized by the market and is reflected in the market price. A similar analysis shows that accounting changes would have no effect on non-competitive (but unregulated) markets.

In regulated markets, however, accounting changes can have significant effects on prices. The essence of the regulatory process is a connection between recognized or adopted accounting costs and prices paid by ratepayers. A rate-of-return regulated firm is entitled to an opportunity to recover its recognized accounting costs plus a fair return on its investment. In the interstate jurisdiction--and most other regulatory jurisdictions--cash accounting has been authorized by the Commission for OPEB expenses. In contrast with unregulated markets, there are no forces at work in regulated firms that require managers to recognize economic costs. Thus, the regulated prices which began the price cap regime for Pacific Bell were based on cash accounting for OPEBs.

However, Pacific Bell's liability for OPEB benefits was being created while employees worked, not when they retired--just as in unregulated markets. Cash accounting resulted in prices which were equal to a measure of cost of service which

understated the true current cost of using an employee to provide service. Only when that employee retired and began using benefits, would cash accounting begin to recognize those costs. Thus, the current cash accounting treatment for OPEBs leads to intertemporal inequities in regulated markets in which future ratepayers will pay a portion of the costs of providing current services.

Adopting FAS 106 and recognizing the difference in costs as an exogenous cost change would lead to the same price level that would have occurred if FAS 106 had been adopted before the beginning of price cap regulation. If FAS 106 had been adopted while the industry was subject to rate of return regulation, the initial levels of prices for price caps would have been set at a level to recover the amortization of the historical liability for OPEBs prior to 1993 and the ongoing expense for OPEB liability incurred in the current year. In addition, since earnings are measured with respect to accounting costs, if FAS 106 had been adopted before the beginning of price caps, measured earnings for sharing with ratepayers would reflect economic costs of OPEBs. Thus the prices (and measured costs) that would exist today if accrual accounting for OPEBs had predated price cap regulation can be attained by adopting an exogenous cost change for FAS 106.

In summary, competitive forces drive prices towards economic costs, but regulatory ratemaking sets prices using adopted accounting costs. In unregulated markets, prices already reflect accrual accounting costs for OPEBs because those are the actual economic costs. However, prices in regulated markets have been (and are currently) set to recover cash accounting costs for OPEBs, not accrual accounting costs. Prices of rate-of-return and price-cap regulated firms thus entail an intertemporal

misallocation of costs in which future ratepayers pay a portion of the economic costs of current services. To correct this inequity, the accounting costs of the regulated firm--and its prices--must be adjusted to recover each year's economic costs as they are incurred and to amortize as quickly as possible the accumulated liability for past years' OPEBs. For price-cap regulated firms, a Z-adjustment must be made to the price cap. Subsequent to adoption of accrual accounting by the FCC, if no price cap changes were allowed, (i) the intertemporal cost misallocation would continue, and (ii) the sharing mechanism would incorrectly transfer funds between shareholders and ratepayers. A Z-adjustment would also lead to the same level of prices that would prevail had accrual accounting for OPEBs been adopted prior to price cap regulation.

C. Exogenous Cost Changes in the Price Cap Formula

In its decision implementing price cap regulation, the FCC recognized the need to adjust the price cap to reflect exogenous cost changes.[13] The definition of an exogenous cost change was given in the decision:

> "Exogenous costs are in general those costs that are triggered by administrative, legislative or judicial action beyond the control of the carriers...These costs are created by such events as separations changes; USOA amendments; changes in transitional and long term support; the expiration of amortizations; and the reallocation of regulated and nonregulated costs."[14]

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[13]Federal Communications Commission, Second Report and Order, CC Docket 87-313, released October 4, 1990, pgh. 166.

[14]Ibid.

The adoption of FAS 106 is a change in accounting procedures, and the FCC price caps decision recognizes such changes as exogenous events:

> "Changes in LEC costs that are caused by changes in Part 32 of our Rules, the Uniform System of Accounts (USOA), will be considered exogenous. We make this classification on the basis that such changes are imposed by this Commission and are outside the control of carriers."[15]

From the perspective of an economist, a Z-adjustment that changes prices for price-cap regulated firms to reflect accrual accounting costs for OPEBs promotes economic efficiency because it moves prices towards economic costs. However, changes in wages (for example) for a regulated firm represent changes in economic costs, and yet few economists would recommend that wage changes be accorded Z factor treatment.[16] In what sense then is the cost change from adoption of FAS 106 different from the cost change from a (hypothetical) wage increase?

Like wages, OPEBs are an element of the compensation package for workers, and Pacific Bell has roughly the same ability to raise or lower OPEB expenses as it does to raise or lower wages.[17] What is beyond the control of the firm are (i) the change in accounting standards, and (ii) the build-up of an historical liability that has resulted from cash accounting in the past. Changes in accounting standards clearly have nothing to do with Pacific Bell management, and the historical liability represents deferred compensation earned by its employees for services rendered in the past.

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[15] Ibid, pgh. 168 [footnotes omitted].

[16] If changes in wages could be passed through to ratepayers by means of a Z-adjustment, the regulated firm would have little incentive to control the wages it pays.

[17] This ability is, of course, not unlimited. Pacific hires workers in competitive labor markets, and changes in OPEB benefits affect its ability to attract and maintain its workforce.

To understand how these accounting changes should be treated under price caps, it is useful to separate the OPEB expense under accrual accounting in any year into two parts:

1. the amortization of the embedded OPEB liability as of 1993, and
2. the on-going accrual associated with current year employees.

Thus the difference between expenses under accrual and cash accounting can be visualized as having two parts: the amortization of the embedded liability plus the difference between accrual expenses for current operations and cash-based accounting OPEB expenses.

The proposed 15 year amortization of the embedded liability can be correctly treated as a pair of Z-adjustments,[11] just like any other amortization (e.g., inside wire and the depreciation reserve deficiency in the FCC price cap plan). The costs in question have already been incurred, and the liability has been quantified.

The second component of the difference in expense streams can be calculated as the difference between OPEB costs associated with current operations and cash-based accounting OPEB expenses. By managing its operations prudently after the one-time 1993 Z factor adjustment, the firm can attempt to control the accrual for OPEBs--just as total OPEB expenses under cash accounting have been treated as endogenous expenditures under the price cap plan. If changes over time in this

[11]One Z-adjustment would be made in 1993, and an offsetting Z-adjustment would be made fifteen years later when the amortization expires.

difference were passed through as annual Z-adjustments, the firm's incentive to manage its OPEB costs prudently would be diminished.

The proposed Z-adjustment in the price cap aligns rates and costs as if price caps had been implemented with prices set using accrual accounting for OPEBs. That one-time change adjusts for the fact (recognized exogenously in FAS 106) that the prices under which price caps were implemented did not reflect the true economic cost of OPEBs offered to workers up until that time. After implementation of the Z factor adjustment, OPEB expenses would again be under management control just like wage expenses. Thus adoption of FAS 106 aligns accounting costs and economic costs, and Pacific's proposed Z-adjustment would align its initial prices with economic costs.

With initial rates set at their appropriate level, Pacific Bell's management would then have the incentive to manage OPEB expenses in the same manner as all other costs.[19] All else equal, if OPEB costs increase, Pacific Bell's earnings would decrease, and vice-versa. These are the same risks and incentives faced by firms in unregulated markets which compensate workers with similar packages of wages, pensions, and OPEBs. Z factor treatment for FAS 106 cost changes would not diminish the incentives of the firm to control its OPEB expenses. Thus, from an economist's point of view, FAS 106 cost changes meet the test for exogeneity as used in the theoretical derivation of the price cap formula.

[19]In this sense, FAS 106 cost changes are similar to separations cost changes, which are the prototype example of an exogenous cost change. Both types of changes are changes in accounting costs, not economic costs. In both cases, the firm can control future expenditures. Nonetheless, separations changes are treated as exogenous cost changes because they enable the regulator to change prices in different jurisdictions.

In this sense, FAS 106 cost changes are similar to separations cost changes, which are the prototype example of an exogenous cost change. Both types of changes are changes in accounting costs, not economic costs. In both cases, the firm retains some control over future expenditures. Nonetheless, separations changes are treated as exogenous cost changes precisely because they enable the regulator to change prices in different jurisdictions:

> "...we will require an exogenous cost adjustment for changes in interstate costs for LECs that are caused by changes in the Separations Manual. As we explained in the Second Further Notice, these changes are imposed by regulators and are outside the control of the carriers...Regulatory decisions that are designed to produce just and reasonable rates must affect the cap in order to ensure that the system results in rates that are just and reasonable."[20]

In the case of OPEBs, the FAS 106 accounting decision must affect the cap in order to ensure that the price cap is based on economic costs.

D. Applying the Price Cap Formula

How should the Z-adjustment for the change to accrual accounting for OPEBs be calculated in the price cap formula? For the regulated firm, the difference in 1993 expenses under FAS 106 and under cash accounting for OPEBs should be estimated and expressed as a fraction of the total annual revenue requirement. For the U.S. economy, a similar calculation should be made for those markets in which accounting cost changes will lead to price changes which, in turn, will affect the growth

[20]Second Report and Order, CC Docket 87-313, released October 4, 1990, pgh. 167.

of GNP-PI. The difference between these effects determines the 1993 Z-adjustment under price caps.

There are several ways in which this simple calculation may appear to overstate the price change required to pass through the cost changes stemming from the FAS 106 accounting changes. First, to the extent that FAS 106 changes affect all U.S. firms, there may be some change in the GNP-PI associated with FAS 106, and simply flowing through the firm's cost change would result in double-counting. The derivation of equation (4) presented above makes it clear that only the difference between the effect of FAS 106 on Pacific Bell costs and on U.S. average costs should be passed through as a Z-adjustment.[21] The rest of the cost change stemming from FAS 106 would be recovered from the assumed change in GNP-PI.[22]

A second apparent double-counting stems from the presence of prices of medical services as a component both of GNP-PI and of Z, the firm's expected change in costs stemming from FAS 106. If a Z-adjustment is made in 1993 (for example) so that the price cap reflects accrual accounting for OPEBs, that Z-adjustment will become part of the price cap that will be adjusted every year by GNP-PI - X. Since the OPEB Z-adjustment already includes expected medical inflation, one might think that the Z-adjustment should not be corrected in every future year for inflation. Possibly it should be isolated from the price cap index in the future, so that,

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[21] That is, if an exogenous event led to a 1 percent reduction in GNP-PI and a 4 percent reduction in telephone company costs, the appropriate Z-adjustment would be a 3 percent reduction in price.

[22] We showed above that the change to accrual accounting was already reflected in prices for competitive markets. The impact of FAS 106 on output prices in the economy will be approximately zero. Thus the appropriate Z-adjustment for the regulated firm will be approximately its increase in accounting expenses.

effectively, it would not be multiplied each year by [1 + GNP-PI - X]. But that would be wrong.

The actual OPEB cost incurred in 1993 is a function of future medical prices. If the OPEB Z-adjustment were made correctly in 1993, it would raise the price cap to the level it would have attained if Pacific Bell had been under accrual accounting for OPEBs all along.[23] Because the Z-adjusted price cap in 1993 represents actual costs in 1993, it follows from equation (4) that all parts of the 1993 price cap must be multiplied by [1 + GNP-PI - X] in 1994, or prices will no longer track costs, assuming that the productivity objective of X is met.

A common error is to examine the price cap adjustment formula and conclude that the GNP-PI term compensates the regulated firm for inflation in the price of its inputs, including medical services to retirees. If that were the case, then compensating the firm for inflation of its 1993 OPEB Z-adjustment might appear to be double-counting. However, the role of GNP-PI in the price cap adjustment formula is not to measure and compensate the firm for input price increases. Rather, GNP-PI is a measure of national output price increases, and the price cap adjustment equation assures us that if the firm meets its productivity target, its output price will have to be multiplied by [1 + GNP-PI - X] every year to keep prices equal to costs.

In summary, while compensating the regulated firm for changes in cost due to adoption of accrual accounting for OPEBs might at first give the appearance of double-counting in several ways, it does not.

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[23]Apart from amortizing the historical liability.

1. The switch to accrual accounting will affect the GNP-PI, but we showed that the formula compensates the firm for the difference between the effect of the accounting change on its prices and the GNP-PI.

2. The Z-adjustment is based on forecasts of future medical inflation, so adjusting the OPEB Z-adjustment component of the price cap for inflation in future years may seem to be double-counting. However, we showed that this argument misinterprets the role of GNP-PI in the price cap formula, and adjusting the entire price cap by (GNP-PI - X) in subsequent years is necessary so that prices track costs.

IV. THE EFFECT OF FAS 106 ON PACIFIC BELL'S INTERSTATE PRICES

In this section, we combine the theory from the previous section with cost estimates for OPEB expenses obtained from Pacific Bell. We are informed that, as a result of adoption of accrual accounting for OPEBs in 1993, Pacific Bell's interstate revenue requirement (as if it were rate-of-return regulated) would increase by $29 million in 1993. We show that the effect of FAS 106 on the prices of other firms in the economy is small so that the effect of the change to accrual accounting on the growth of GNP-PI is very small (less than 0.12 percent). Thus Pacific Bell's price cap must also increase by close to $29 million (more than $27 million, as discussed below) so that its prices will cover its costs, and the intertemporal inequity by which future ratepayers pay for current services will be eliminated.

A. The Effect of FAS 106 on Pacific Bell Costs is Approximately 1.92 Percent

A shift to accrual accounting for OPEBs would lead to an increase in 1993 expenses, primarily because of the amortization of the historical OPEB liability. When the amortization expires after 2008, there will be a symmetric reduction in expenses under accrual accounting relative to cash accounting. For a rate-of-return-regulated firm, this shift in expenses would generate a similar shift in prices, reducing the inter-generation inequity. To insure that the change to accrual accounting for OPEBs also eliminates the inter-generation inequity for price-cap-regulated firms, we must pay special attention to how the annual Z factor adjustments are made.

The Z-adjustment to prices to account for FAS 106 should equal the change in expenses attributable to FAS 106. In turn, the change in 1993 expenses attributable to FAS 106 would equal the change in revenue requirements resulting from the change from cash to accrual accounting for OPEBs.[24] Specifically, let A_t be the incremental revenue requirement for OPEBs in year t under accrual accounting and C_t be the incremental OPEB revenue requirement under cash accounting. Then the 1993 proportional expense change ΔE_{1993} would be

$$\Delta E_{1993} = \frac{(A_{1993} - C_{1993})}{(Total\ Revenue\ Requirement)_{1993}} . \quad (5)$$

[24]Pacific Bell's interstate expenses for OPEBs reflect partial implementation of accrual accounting in that Pacific Bell is currently using tax-deductible funding vehicles for OPEBs. Thus, the change in expenses represents the effects of full implementation of accrual accounting.

In accordance with the accounting requirements under FAS 106, Pacific Bell has estimated the expenses that would be incurred under cash and accrual accounting for OPEBs.[25] For the interstate jurisdiction, OPEB revenue requirements under accrual accounting would be $59 million in 1993 compared with cash accounting expenses of $30 million. Therefore, Pacific's revenue would have to increase by $29 million in 1993 in order for the company's revenue to match what its 1993 expenses would have been had the FCC adopted accrual accounting for OPEBs before price caps were begun. This increase represents a price increase of about 1.92 percent, based on an estimated Pacific Bell 1993 interstate revenue billing base of about $1,493 million.[26] Assuming the 1993 interstate revenue requirement is about $1,493 million, application of equation (5) would produce a price increase of about 1.92 percent (relative to prices under continued cash accounting for OPEBs) in the first year.[27]

B. The Effect of FAS 106 on the GNP-PI is Less Than 0.12 Percent

Under price caps, a utility's exogenous cost changes will be fully recovered through changes in the GNP-PI if (i) they are of the same relative size as for a typical firm in the U.S. economy, and (ii) the typical firm will pass through the

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[25] As we understand it, Pacific's estimate of expenses under accrual accounting is based on an Accumulated Post-retirement Benefit Obligation that has been reduced by the amount of the tax free funding Pacific has already incurred. Without this funding before the start of FAS 106 requirements, the OPEB expenses under accrual accounting for 1993 would be greater.

[26] This estimate is conservative (high) because it includes anticipated revenues before sharing. Revenues that just matched the benchmark rate of return of 11.25 percent would be lower, thus increasing the percentage increase in exogenous expenses.

[27] [$59 - $30]/$1,493 = 1.92%.